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of *column* 3 with *row* 4. Then $4+5=9$=one number, and 4=the other number; $97=9^2+4^2$.

To find the two numbers the sum of whose squares=the square of $4p+1$; one of the numbers$=4p+1-2r^2$, and the other number$=4p+1-(2N-1)^2$.

Take 97. Then $97-2\times4^2=65$=one of the numbers, and $97-5^2=72$; $97^2=65^2+72^2$.

TABLE OF VALUES OF $4p+1$=THE SUM OF TWO SQUARES.

	1	2	3	4	5	6	7	8	9	10	11	12	13
	1	3	5	7	9	11	13	15	17	19	21	23	25
1	5	17	37	65	101	145	197	257	325	401	485	577	677
2	13	29	53	85	125	173	229	293	365	445	533	629	733
3	25	45	73	109	153	205	265	333	409	493	585	685	793
4	41	65	97	137	185	241	305	377	457	545	641	745	857
5	61	89	125	169	221	281	349	425	509	601	701	809	925
6	85	117	157	205	261	325	397	477	565	661	765	877	997
7	113	149	193	245	305	373	749	533	625	725	833	949	1073
8	145	185	233	289	353	425	505	593	689	793	905	1025	1153
9	181	225	277	337	405	481	565	657	757	865	981	1105	1237
10	221	269	325	389	461	541	629	725	829	941	1061	1189	1325
11	265	317	377	445	521	605	697	797	905	1021	1145	1277	1417
12	313	369	433	505	585	673	769	873	985	1105	1233	1369	1513
13	365	425	493	569	653	745	845	953	1069	1193	1325	1465	1613
14	421	485	557	637	725	821	925	1037	1157	1285	1421	1565	1717
15	481	549	625	709	801	901	1009	1125	1249	1381	1521	1669	1825
16	545	617	697	785	881	985	1097	1217	1345	1481	1625	1777	1937
17	613	689	773	865	965	1073	1189	1313	1445	1585	1733	1889	2053
18	685	765	853	949	1053	1165	1285	1413	1549	1693	1845	2005	2173
19	761	845	937	1037	1145	1261	1385	1517	1657	1805	1961	2125	2297
20	841	929	1025	1129	1241	1361	1489	1625	1769	1921	2081	2249	2425
21	925	1017	1117	1225	1341	1465	1597	1737	1885	2041	2205	2377	2557
22	1013	1109	1213	1325	1445	1573	1709	1853	2005	2165	2333	2509	2693
23	1105	1203	1313	1429	1553	1685	1825	1973	2129	2293	2465	2645	2833
24	1201	1305	1417	1537	1665	1801	1945	2097	2257	2425	2601	2785	2977
25	1301	1409	1525	1649	1781	1927	2069	2225	2389	2561	2741	2929	3125
26	1405	1517	1637	1765	1904	2045	2197	2357	2525	2701	2885	3077	3277
27	1513	1629	1753	1885	2025	2173	2329	2493	2665	2845	3033	3229	3433
28	1625	1745	1873	2009	2153	2305	2465	2633	2809	2993	3185	3385	3593

MISCELLANEOUS.

62. Proposed by G. B. M. ZERR, A. M., Ph. D., Professor of Mathematics and Science, Chester High School, Chester, Pa.

A tube of uniform cross section, small compared with its length, is bent into the form of a cycloid, its open ends lying at the cusps, and this cycloid is placed with its axis vertical and its vertex downwards. Equal quantities of fluids of specific gravity σ_1 and σ_2 are poured in at the two cusps, the quantity of each being such as would fill a length of the tube equal to its axis a. If the fluids do not mix, find the distance x_1, x_2 of the upper levels of the fluids from the vertex measured along the cycloidal arc. [From *Procter's Geometry of the Cycloid.*]

Solution by the PROPOSER.

Let P be the atmospheric pressure. Then the pressure at the first surface of separation is $P+g\sigma_1[x_1^2-(x_1-a)^2]/8a$.

Similarly at the second or free surface, $P+g\{\sigma_1[x_1^2-(x_1-a)^2]+\sigma_2[(x_1-a)^2-(x_1-2a)^2]\}/8a$.

$\therefore\ P=P+g\{\sigma_1[x_1^2-(x_1-a)^2]+\sigma_2[(x_1-a)^2-(x_1-2a)^2]\}/8a$.

$\therefore\ 2x_1(\sigma_1+\sigma_2)=a(\sigma_1+3\sigma_2)$.

Similarly $P=P+g\{\sigma_2[x_2^2-(x_2-a)^2]+\sigma_1[(x_2-a)^2-(x_2-2a)^2]\}/8a$.

$2x_2(\sigma_1+\sigma_2)=a(3\sigma_1+\sigma_2)$.

63. Proposed by F. M. SHIELDS, County Surveyor, Coopwood, Miss.

Of three chronometers, A, B, and C, A keeps true time; B gains 5 minutes and $15\frac{3}{4}$ seconds a day by true time, and C loses 7 minutes and $15\frac{3}{7}$ seconds a day by true time. The hands of all three watches are set at 12 noon on a certain day. What is the time by the true watch, A, on the *fifth* day after the time when the hands of the fast watch, B, point to 12, and what is the time by the true watch, A, on the *tenth* day after the time when the hands of the slow watch, C, point to 12?

I. Solution by J. H. DRUMMOND, LL. D., Portland, Me.

B goes $1445\frac{21}{80}$ minutes while A goes 1440; then $1445\frac{21}{80}:1440::5:$ 4d. 23h. $33\frac{90567}{115621}$m., and the answer is $33\frac{90567}{115621}$ minutes past eleven.

C goes $1432\frac{26}{35}$ while A goes 1440; hence $1432\frac{26}{35}:1440::10:$ 10d. 1h. $12\frac{23544}{25073}$m., and the answer is $12\frac{23544}{25073}$ minutes past one.

II. Solution by ALOIS F. KOVARIK, Instructor in Mathematics and Physics, Decorah Institute, Decorah, Ia.

While the watch A goes 24 hours, or 1440 minutes, the watch B goes 1445 minutes, $15\frac{3}{4}$ seconds, or $1445\frac{21}{80}$ minutes. To find how much the watch A is behind B at the end of 24 hours *by* B, we find 1 minute of B equal to $1445\div1445\frac{21}{80}$ of A's, and 1440 minutes of B's$=1440\div1445\frac{21}{80}=1434\frac{87486}{115621}$, *i. e.* when the hands of the watch B point to 12 at the end of the first 24 hours *by* B, the watch A lacks $5\frac{28135}{115621}$ minutes. On the *fifth* day after time when the hands of the watch B point to 12, the watch A lacks $5\frac{28135}{115621}\times5=26\frac{25054}{115621}$ minutes to 12.

At the end of the first 24 hours *by* C the watch A is $7\frac{7369}{25073}$ past 12. On the tenth day after time when the hands of the slow watch C point to 12, the time by the true watch A is $7\frac{7369}{25073}\times10=72\frac{23544}{25073}$ minutes, or 1 hour, $12\frac{23544}{25073}$ minutes past 12.

III. Solution by P. S. BERG, A. M., Principal of Schools, Larimore, N. D.

24 hours, 5 minutes and $15\frac{3}{4}$ seconds on chronometer B equals 24 hours on chronometer A. Hence 5 days on B equals 4 days, 23 hours, 33 minutes and 46.9 seconds on A. Therefore the time by the true watch A is 11 hours, 33 minutes, and 46.9 seconds A. M. on the fifth day.

$1432\frac{26}{35}$ minutes on chronometer C equals 1440 minutes on chronometer A.